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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/534,784	01/04/2006	Didier Grouset	NY-Gryn 220-US	8913

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EXAMINER	
STALDER, MELISSA A	
ART UNIT	PAPER NUMBER
4162	
MAIL DATE	DELIVERY MODE
10/03/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/534,784	GROUSET ET AL.	
	Examiner	Art Unit	
	MELISSA STALDER	4162	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 January 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *22-42* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *22-42* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *05-13-05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 22, 23, 32, and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sederquist (WO 01/25141) in view of Edlund (US 2001/0045061). Sederquist teaches an autothermal reformer which produces hydrogen from hydrocarbons where the reformer is supplied with a vaporized fuel, a superheated steam stream, and an oxidant stream (p. 9, lines 1-9). The oxidant can be substantially pure oxygen (p. 11, line 23). The reformer also contains a catalytic combustion bed where the reformate stream is oxidized (p. 3, lines 26-27). The principal combustion reactions taught produce mostly carbon monoxide, carbon dioxide, hydrogen, and some water vapor. The stream is cooled by heat exchange and can be arranged in heat exchange with the water, steam, or fuel vaporizers (p. 18, line 25- p. 21, line 3). The hydrogen produced can be used for a fuel cell (p. 20). Sederquist does not teach the use of high pressure in the reformer. Edlund teaches the use of pressure in a reformer in the range of 50 psi to 1000 psi (3.45 bar to 68.9 bar). It would have been obvious to one of ordinary skill in the art at the time of the invention to use high pressure because Edlund teaches that these pressures are typical for steam reformers (0034).

3. Regarding claims 23 and 33, Sederquist teaches the addition of water to convert CO to carbon dioxide (p. 2, line 10).

4. Claims 24-26 and 34-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sederquist (WO 01/25141) in view of Edlund (US 2001/0045061) as applied to claims 23 and 33 above, and further in view of Wikstrom (US 2003/0021743). Sederquist and Edlund teach a reformer and method of using the reformer to produce hydrogen but do not teach the condensation of carbon dioxide into liquid form. Wikstrom teaches a steam reformer which produces hydrogen and carbon dioxide where the carbon dioxide is cooled to a liquid in the heat exchanger (0017-0018). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the reformer of Sederquist and Edlund with the carbon dioxide cooling of Wikstrom because Wikstrom teaches that the liquid carbon dioxide can then be collected and stored for future use (0018). Additionally, the fuel cell is fed air for temperature control (abstract).

5. Regarding claims 25, 26, 35, and 36, Edlund teaches a hydrogen-permeable membrane after the reformation process before the hydrogen is introduced into the fuel cell. In addition, Edlund teaches the introduction of air to the fuel cell (dilution). Edlund teaches the purification of carbon dioxide and carbon monoxide from the hydrogen stream where the concentration of carbon monoxide is much lower than carbon dioxide (0032). Finally, Edlund teaches the use of pressure swing absorption (PSA) in the separation region prior to the fuel processor the entry of hydrogen into the fuel processor. Inherently, PSA lowers the pressure of the gas flowing though the system (0030). Pressure swing adsorption involves the use of a membrane where a first step of

high pressure removes impurities and is followed by a low pressure swing that releases the separated gases (simultaneous).

6. Regarding claims 27 and 37, Edlund teaches that by regulating the flow and/or temperature of air delivered by the system, the temperature of the reforming region may be controlled (0067).

7. Regarding claims 28 and 39, Edlund teaches that the combustible fuel may be at least partially formed from the byproduct stream or from product hydrogen stream through a conduit (0046). The exhaust from the combustion region flows through heating conduits in reforming regions to provide additional heating. The conduits are designed to provide sufficient surface area and desirable uniform distribution of heat throughout reforming regions (0046).

8. Regarding claims 29 and 40, Edlund teaches a fuel cell fed with the stream from the reformer with a delivery system. The delivery system can include any suitable mechanism, device, or combination thereof that delivers the feed stream to the fuel processor. It may include pumps (for compression) or a valve assembly adapted to regulate the flow of the components from a pressurized supply (lower the pressure) (0024).

9. Regarding claim 38, Edlund teaches a filter assembly that can be a filter cloth in the shape of a tube or ceramic tubes and discs can be used as filters (0043). A glove finger describes a tube within another tube, which is taught in Edlund in Figure 14 and described in paragraph 43.

10. Claims 30 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sederquist (WO 01/25141) in view of Edlund (US 2001/0045061) as applied to claims 22-29 and 32-40 above and further in view of Vinegar (2002/0117303) Sederquist and Edlund teach a reformer and method of using the reformer to produce hydrogen but do not teach the use of electrolysis to produce pure oxygen. Vinegar teaches the oxygen production by the electrolysis of water where the oxygen is produced on site and continuously injected into a formation, the source for producing hydrogen. It would have been obvious to one of ordinary skill in the art at the time of the invention to produce oxygen on-site in a reformation process of Sederquist and Edlund because both products of the electrolysis can be used beneficially in the apparatus. The oxygen can be injected in order to raise the temperature of the reformation process and the hydrogen can be used as a fuel stream for a fuel cell (0624).

11. Claims 31 and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sederquist (WO 01/25141) in view of Edlund (US 2001/0045061) as applied to claims 22-30 and 32-41 above and further in view of McGann (US 4,158,680). Sederquist and Edlund teach a reformer and method of using the reformer to produce hydrogen but do not teach a nitrogen production method that generates nearly pure oxygen. McGann teaches that nitrogen is produced as a by-product in a conventional air separation unit that produces substantially pure oxygen (95 mole % oxygen or more) for use as a free-oxygen containing gas in the fuel gas generator. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the reformer of Sederquist and Edlund with the nitrogen separation of McGann because

McGann teaches that nitrogen can then be used economically for stripping in a solvent absorption process as it is a low-cost by-product of the separation (col. 4, lines 41-53).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MELISSA STALDER whose telephone number is (571)270-5832. The examiner can normally be reached on Monday-Friday, 8:00-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jennifer McNeil can be reached on 571-272-1540. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MS

/Jennifer McNeil/
Supervisory Patent Examiner, Art Unit 4162